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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,317	11/14/2001	Mark M. Wang	265/074	5655

34263 7590 11/10/2003

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EXAMINER

WEBER, JON P

ART UNIT	PAPER NUMBER
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1651

DATE MAILED: 11/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/993,317	Applicant(s) WANG ET AL.	
	Examiner Jon P Weber, Ph.D.	Art Unit 1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 15-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 15-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

Status of the Claims

The response with amendments filed 29 September 2003 has been received and entered. Claims 1-8 and 15-21 have been presented for examination.

Election/Restrictions

Applicant's election without traverse of Group I, claims 1-8 and 15-21 in the Paper filed 29 September 2003 is acknowledged. Non-elected claims have been canceled.

Information Disclosure Statement

The Information Disclosure Statements filed 02 February 2002 and 28 October 2002 have been considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 and 15-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiou et al. (1997) in view of Imasaka et al. (EP 635,994), Nishimura et al. (EP 556,748) and Grier et al. (US 6,055,106).

Chiou et al. (1997) disclose interferometric optical manipulation of small dielectric particles. The interference pattern may be generated in two basic ways: with two beams (Fig. 1

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b and 1c, illustrate two ways), and a single beam in concert with a grating such as Ronchi (page 9, col. 2, first full paragraph). The second method is said to be possibly more favorable because it is simpler, more compact, easily modified and more cost effective. The interference pattern may be moved with respect to the particles in the sample chamber by means of moving a mirror (M1 in Fig 2), or by moving the chamber. Movement can be at constant or variable velocity. The fringe spacing in the pattern can be varied by translating the positions of the magnifying lenses (page 8). When the interference pattern is swept across the sample chamber, the particles are moved. Two or more particles can be independently manipulated at the same time. Cigar shaped patterns can be generated to manipulate rod-shaped (e.g. biological) samples. Chiou et al. (1997) do not clearly use the relative motion of the interference pattern with respect to the particles to separate particles having different properties, although independent manipulation of the particles is suggested.

Imasaka et al. (EP 635,994) and Nishimura et al. (EP 556,748) both disclose that particles with different properties, e.g. size or refractive index, moving through one or more optical tweezers experience different braking forces and therefore separate by velocity.

Grier et al. (US 6,055,106) disclose using a diffraction apparatus for generating an optical gradient that optionally may be frequency, phase and time dependent and using the optical gradient to manipulate microparticles. Holograms or controllable liquid crystal arrays may be used to generate the gradient (column 5, lines 8-22). The optical tweezer trap may be moved relative to the sample (column 5, lines 23-52) so as to move the particles using mirrors and motors.

A person of ordinary skill in the art at the time the invention was made would have

been motivated to use the methods and device of Chiou et al. (1997) to separate particles because Chiou et al. (1997) suggest that particles can be independently manipulated and Imasaka et al. (EP 635,994) and Nishimura et al. (EP 556,748) establish that particles with different properties can be velocity separated when the particles are moving relative to the optical tweezer. Thus the relative movement of the interference pattern of Chiou et al. (1997) would reasonably be expected to move particles having different properties with different velocities and thereby separate the particles.

Varying the time, phase and frequency as well as mechanical or mirror movement to obtain relative movement of the interference fringes with respect to the particles is suggested by Grier et al. (US 6,055,106). This is accomplished with holographic or liquid crystal array gratings, for example.

Hence, it would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to separate particles on the basis of size by means of the relative motion of an interference pattern based optical tweezer. The selection of particular means of vary the relative motion and create the interference pattern is an arbitrary matter of experimental design choice from well-known methods in the art. At any given periodicity in the fringe pattern of Chiou et al. (1997) particles would be expected to size separate based on their relative interactions with the light.

No claims are allowed.

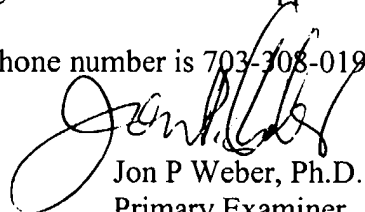
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon P Weber, Ph.D. whose telephone number is 703-308-4015. The examiner can normally be reached on daily, off 1st Fri, 9/5/4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Wityshyn can be reached on 703-308-4743. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.



Jon P Weber, Ph.D.
Primary Examiner
Art Unit 1651

JPW
6 November 2003